

Disinfection air and surfaces: contemporary fine by forming a 5 mm without wetting on the basis of hydrogen peroxide –nocolyse generated by nebulizer Nocospray

Procesul de dezinfectare al aerului și suprafețelor prin formarea unei ceți foarte fine de 5 μm, fără umezire, pe baza de peroxid de hydrogen –nocolyse generată de nebulizatorul Nocospray

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Abstract

Nocospray is a revolutionary concept for bio professional disinfection, with bactericidal, virucidal, fungicidal and sporicidal effect using hydrogen peroxide as the active substance in combination with colloidal silver, called Nocolyse. Based on the Venturi effect, this system offers a revolutionary disinfection efficiency of 99.99%, with range up to 15m towards equipment, covering by sedimentation in only 60 minutes / 1000 m³ per mm² / area, requiring simultaneous use of more equipment for large areas (over 1000m³).

Rezumat

Nocospray este un concept revoluționar destinat bio dezinfectiei profesionale, cu acțiune bactericidă, virucidă, fungicidă și sporicidă, utilizând ca substanță activă peroxidul de hidrogen în combinație cu argint coloidal, denumită NOCOLYSE. Având la bază efectul Venturi, acest sistem revoluționar oferă o eficiență de dezinfectare de 99,99%, cu raza de acțiune până la 15m față de poziționarea echipamentului, acoperind prin sedimentare în numai 60 de minute/1000 m³ fiecare mm²/suprafață, impunând în cazul spațiilor cu volume mari (peste 1000m³) utilizarea simultană a mai multor echipamente

Introduction

Nocospray consists of a 22000 rpm turbine which, under thermal effect, ionizes and transforms the liquid product into micrometric particles, resulting in a dry mist covering the entire volume in the area to be disinfected. Product buoyancy combined with volumetric pressure allows it to reach to high areas (5-10 m high ceilings), therefore no mm² shall remain unsterilized.

Since it is used on daily basis in hospitals (operation rooms, intensive care units, maternities) and clinics, this product is recommended also in animal husbandry,

sanitary-veterinary laboratories, veterinary clinics, kindergartens, schools, hotels, residential compounds, transport means and any other public areas, generating a safe 99,99% disinfected environment.

The utmost advantage is the virucidal, bactericidal, sporicidal and fungicidal history reset which has been build-up in the treated area.

With Nocospray:

- the disinfection time is reduced by 50-70% compared to manually operated methods, yet prior clean-up is required.
- it allows the disinfection of any inside area, including electronic devices. It does

not generate residues and germ resistance.

- short application time, the room can be used after only 30 minutes.
- it spreads on every cm^3 , avoiding moisture, without risk of staining or corrosion.
- is effective regarding the amount used - 1 ml to 1 m^3 . Does not require any post treatment action, no need to dry or ventilate. Area can be freshened.

1. Material and method

- The disinfectant is up to 99.9% biodegradable
- is non-toxic, non- allergenic
- is anticorrosive (dry mist)
- no induced bacterial resistance.

Mode of action

Our product is based on the association between Nocospray nebulizer and Nocolyse disinfectant



Figure 1 Disinfectant nebulization on the premises

Nocospray is easy to use, being a compact portable disinfection system

preventing the spread of lethal diseases and pathogenic agents.

The patented dispersion technique disinfects all rough areas reducing by $> 6 \log$ (99.9999%) the infective organisms, including *Clostridium difficile* (C. dif), *Methicillin-resistant Staphylococcus aureus* (MRSA) and *Norovirus* [2].

The classical nebulization does not cover the walls, ceiling, high technical areas, since the products used cause unaesthetic stains at contact with surfaces which are hard to keep.

Since the mist is wet, it is a major risk factor for active electrical and electronic devices (under voltage) that cannot be disconnected, and the safety measures required for the operator (breathing mask, protective contact equipment) including the ventilation of areas during access and closure of rooms for long periods of 6 up to 24 hours prove the advantage of Nocospray. [1].

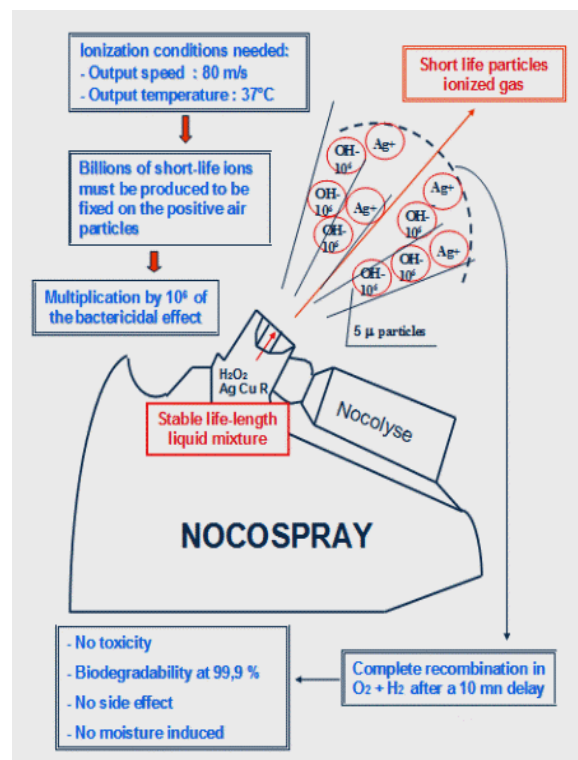


Figure 2 The disinfectant action mode

Nocolyse disinfectant is nebulized in order to form an aerosol, which is then propelled by Nocospray turbine combining the very high speed of particles with their prior heating.

- The size of the particles developed (5 μ on average) in moist-free mist ensures the slow and perfectly uniform spread on each and every cm^2 of the disinfected area, preventing moisture and corrosion
- No essential organic compounds are formed due to fast degradation of more than 99.9% of the mist leaving no trace after its action.

The procedure of use consists of 2 distinct stages:

1. Spraying - for 3,6 seconds / m^3
2. Product binding to the surface - 15 min [4]

Nocolyse is not corrosive, does not stain, needs no area ventilation, is not harmful for people and environment, leaves no residues, is 100% safe for active electronic devices.

Nocolyse provides virucidal, bactericidal, sporocidal and fungicidal protection by regular disinfection every 2-30 days depending on the traffic in the respective area. The major benefit of this concept is the total history and toxic load (virucidal, bactericidal, sporocidal and fungicidal) reset in the disinfected area.

Nocolyse effect enhancement

The combination between speed and temperature enables the ionization of released particles and peroxide degradation, resulting in short-lived oxidant free radicals (superoxide ion).

Conclusion of the 3 stages

- High speed spraying: Nocolyse active substance concentration by dehydration, creating a „dry mist“
- ionization of radicals: bactericidal effect increase
- catalytic action of silver atoms: 1 Ag^+ ion attracts 1,000,000 OH^- ions

2. Results and discussions

Bacterial self-destruction

There are 3 independent mechanisms, yet with a joint goal: modification of bacterial membrane permeability:

- oxidation of carbon bridges on the bacterial surface (interruption of double bonds between carbon atoms) due to free electrons released by hydroxide radical OH^-
- this mechanism changes membrane permeability and destroys spore surface.
- the transfer of electrons transported by OH^- ions to the salts, electrolytes and proteins of the membrane or cytoplasm (depending on the type of bacterium). These components are ionized and a part of the free Cl^- ions are recombined in Cl_2 which determines bacterial self-destruction.
- Bacterial immersion: the water from the air enters the bacterium due to membrane polarity modifications. The osmotic overpressure kills the bacterium (a bacterium can survive dryness but not water overpressure).
- the minimum infective risk is achieved after a few days of regular application of the product and maintenance to minimum parameters by mere daily use of Nocolyse disinfectant.



Figure 3. Nocospray

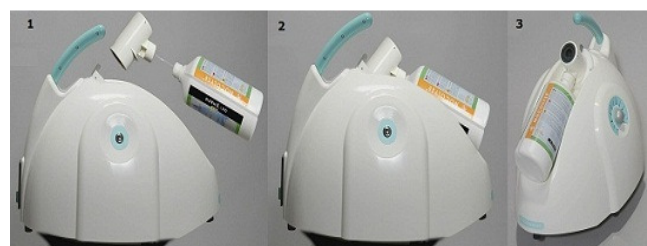


Figure 4. Assembly of NOCOLYSE container



Figure 5. NOCOLYSE container

3. Conclusions

Cost-effectiveness

- A very small amount of disinfectant is necessary: only 1 ml to disinfect 1 m³.
- A single person can perform the disinfection procedure.

Time-saving

- The only action before disinfection is the clean-up of the organic load (wastes) with good detergent
- A 50 m³ area can be disinfected in just 33 minutes. (3 minutes of spraying and 30 minutes of contact)
- No action needed after disinfection (no need to dry or ventilate the room).

Easy to use

- The nebulizer requires no special indications for use.
- Any person can use it.
- Schedule the nebulizer depending on the volume to be disinfected
- Automatic stop
- Possibility to use a time controller.

Easy to handle

The nebulizer weighs only 5.8 kg
Easy to carry due to its ergonomic handle

- Totally effective against all germs: bacteria, viruses, fungi, spores
- This process is based on the formation of dry mist spread on each cm².
- Volumes between 1m³ and 20000m³ can be treated.
- It does not cause moisture or peracetic acid, therefore it is not corrosive, enabling thus the treatment of electronic devices.
- It removes the unpleasant odors from the previous use of the sodium hypochlorite as well as organic odors.
- The products do not contain any chemicals harmful for the human operators, pets, being completely biodegradable
- The system is 99,99% successful for disinfection.

References

Web sites :

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